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M. [US/US]; 9069 Cambridge Road, Woodbury, Minnesota 55125 (US). SPINELLI, Julio C. [US/US]; 5612 Chatsworth Street, Shoreview, Minnesota 55126 (US).

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(74) Agents: CLISE, Timothy B. et al.; Schwegman, Lundberg, Woessner & Kluth, P.a.ll.p.o. Box 2938, Minneapolis, Minnesota 55402 (US).

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(71) Applicant (*for all designated States except US*): CARDIAC PACEMAKERS, INC. [US/US]; 4100 Hamline Avenue North, St. Paul, Minnesota 55112-5798 (US).

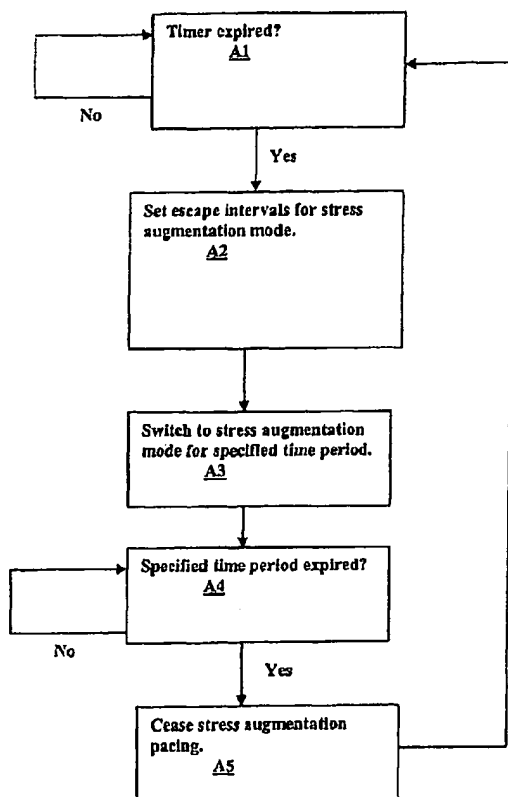
(72) Inventors; and

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(54) Title: CONTROLLED INTERMITTENT STRESS AUGMENTATION PACING



(57) Abstract: A device and method for delivering electrical stimulation to the heart in a manner which provides a protective effect against subsequent ischemia is disclosed. The protective effect is produced by configuring a cardiac pacing device to intermittently switch from a normal operating mode to a stress augmentation mode in which the spatial pattern of depolarization is varied to thereby subject a particular region or regions of the ventricular myocardium to increased mechanical stress.

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> INV. A61N1/365		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) A61N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, PAJ, WPI Data		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 437 159 A (PACESETTER INC [US]) 14 July 2004 (2004-07-14) abstract; figures 2,3 paragraphs [0003], [0052]	1-13
Y	-----	16-19
X	US 6 238 422 B1 (VAN OORT GEESKE [NL]) 29 May 2001 (2001-05-29) abstract; figure 5 column 2, line 30 - column 3, line 13 column 3, line 42 - column 6, line 55	1,2
Y	-----	3,6
X	US 2002/128563 A1 (CARLSON GERRARD M [US] ET AL) 12 September 2002 (2002-09-12) abstract; figure 1 paragraph [0043]	14,15
Y	-----	16-19
-/--		
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Wetzig, Thomas

## INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/093034 A1 (GIROUARD STEVEN D [US] ET AL) 13 May 2004 (2004-05-13) abstract; claims 1,8 -----	14,16,19
Y	US 6 865 420 B1 (KROLL MARK W [US]) 8 March 2005 (2005-03-08) abstract column 3, line 3 - line 11 -----	3,6,14, 16,19
E	WO 2006/079010 A (MEDTRONIC INC [US]; ROUW MATTIAS [NL]; BOUTE WILLEM [NL]; VAN DAM PETE) 27 July 2006 (2006-07-27) the whole document -----	1-13

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1437159	A	14-07-2004	US 2004138716 A1	15-07-2004
US 6238422	B1	29-05-2001	NONE	
US 2002128563	A1	12-09-2002	EP 1365836 A2	03-12-2003
			WO 02072196 A2	19-09-2002
			US 2004193066 A1	30-09-2004
			US 2002128564 A1	12-09-2002
US 2004093034	A1	13-05-2004	AU 2003287734 A1	03-06-2004
			EP 1560615 A1	10-08-2005
			JP 2006506130 T	23-02-2006
			WO 2004043522 A1	27-05-2004
			US 2006247686 A1	02-11-2006
US 6865420	B1	08-03-2005	NONE	
WO 2006079010	A	27-07-2006	US 2006167513 A1	27-07-2006